F. SUMMARY OF SITE RISKS

In 1994, a baseline risk assessment was conducted for the KHL-OU3, another OU in the Site, to evaluate risks to human health under unremediated conditions. Due to the similarities between the KHL-OU3 and the 12th St.-OU4, such as similar waste (i.e., PCB-contaminated residuals generated from the same paper recycling process at similar concentrations), identical routes of exposure, and identical receptors, it was assumed that there was a similar level of unacceptable risk at the 12th St.-OU4. Consequently, an OU-specific risk assessment was not conducted for 12th St.-OU4.

A Site-wide Baseline Ecological Risk Assessment (BERA) was however, completed in June 1999 (subsequently amended in August 2000). Although the BERA is currently being revised by the MDEQ and the United States Environmental Protection Agency (U.S. EPA), results of the BERA continue to indicate that PCB concentrations in surface water, in-stream sediments, and floodplain sediments that can erode into an aquatic environment and which are present at the 12th St.-OU4, exceed threshold levels that are protective of ecological health. A Human Health Risk Assessment (HHRA) that is currently being completed also indicates that there is an unacceptable risk for ingestion of biota from the Kalamazoo River. Listed below is a summary of risks.

1. Human Health Risks

Based on the setting of the 12th St.-OU4 and the known existing conditions, PCBs are the primary threat. Possible exposure pathways include incidental ingestion and dermal contact with surface soil, sediment, and residuals by on-site workers, trespassers and anglers; inhalation of airborne particulates by on-site workers; and, ingestion of fish.

As previously explained, the King Highway Landfill Risk Assessment was used to estimate the risks associated with incidental ingestion, dermal contact, and inhalation exposure scenarios. The HHRA being completed summarizes the human health risks. PCB concentrations detected at the 12th St.-OU4 exceed the threshold levels identified in the HHRA, and exceeds applicable criteria outlined in the NREPA.

2. Environmental Risks

The primary habitat in the vicinity of the 12th St.-OU4 is the Kalamazoo River and associated extensive wetlands and the woodland. The landfill sides, upslope from the Kalamazoo River, are part of the ecosystem encompassed by the Kalamazoo River, woodland, and wetlands. There are no barriers to prevent fauna movement to the landfill, woodland, wetlands, adjacent property, or river that have been impacted by PCB releases from the landfill, all of which provide habitat for terrestrial and aquatic species.

The aquatic flora and fauna in the vicinity of the 12th St.-OU4 are typical of the area. Most aquatic wildlife species are generally associated with the adjacent river and wetlands. The aquatic habitat of the river and wetlands adjacent to the landfill provide support for development of various life stages of fish, turtles, and amphibians.

Terrestrial wildlife species which inhabit the 12th St.-OU4 include small mammals (e.g., mice, squirrels, woodchucks, mink, raccoons, fox, and muskrats) and birds, especially passerines and waterfowl. The Kalamazoo area is part of a major migratory flyway route for waterfowl species, and the area surrounding the 12th St.-OU4 is a migratory stopover that attracts and supports waterfowl. During nesting season, vegetation in the area provides cover and materials for nesting. Larger mammals, such as white-tailed deer, also use the 12th St.-OU4 as indicated by the deer paths running over the top and along the sides of the landfill. Muskrat dens have been observed in the wetlands and there is evidence of extensive burrowing into the sides of the landfill by fox and woodchuck.

There is no federally listed endangered or threatened species known to reside within the 12th St.-OU4. Because the 12th St.-OU4 is one of several sources of PCBs to the rest of the Site, it is important to consider the federally listed endangered or threatened species that inhabit the entire Site. The federally-listed endangered or threatened species known to reside within the Site are two turtle species that are considered scarce, one snake species that is considered endangered, bald eagles that are considered a threatened species, and four threatened and one scarce plant species.

Total PCB concentrations that were detected at the 12th St.-OU4 in surface water and sediment exceed the state Surface Water Quality Division standards for protection of avian and mammalian wildlife.

Environmental risks associated with exposure to PCBs from the 12th St.-OU4 are listed below.

- Sensitive aquatic biota such as invertebrates and fish, are likely to be adversely affected both directly (direct contact) and indirectly (food chain) by PCBs in surface water and sediment. These effects include mortality, reproductive effects (i.e., failure), decreased populations, and growth retardation for sensitive species.

- PCB contamination of surface water and sediment affects sensitive piscivorous predators, such as mink, through consumption of PCB-contaminated prey. Impaired reproduction of mink and, ultimately, decreases in mink populations are the observed effects of PCB contamination in aquatic prey.

- Other less sensitive piscivorous predators, such as bald eagles, are at risk if fish are consumed and if foraging takes place mostly within contaminated aquatic areas. Bald eagles have successfully nested only three times since 1990 at the Site, producing a total of only five young. This success rate is well below what the U. S. Fish and Wildlife Service considers either a stable or healthy population**.**

- Terrestrial and semi-aquatic biota are at risk from PCB-contaminated sediment and soil, depending on life history (e.g., foraging behavior, diet, mobility) and sensitivity to PCBs.

- Carnivorous terrestrial species are likely to be at significant risk if foraging is concentrated in riparian areas with PCB-contaminated soil or sediment, and diet consists of prey that reside in PCB-contaminated areas.

- Omnivorous terrestrial species, represented by mice, appear to have moderate potential for risk from PCB-contaminated soil and sediment. These risks would be location-dependent, and would be influenced by diet, season, mobility of consumers, and by the level of contamination in food items.

- Omnivorous birds that consume a substantial amount of vegetation, represented by the robin, may be at risk if consumed terrestrial plants are taken from highly contaminated areas. Consumption of terrestrial invertebrates such as earthworms is also expected to contribute to total PCB intake.

- Semi-aquatic herbivorous mammals, represented by muskrat, are at risk from PCB contamination because estimated dietary doses exceed recommended threshold values for rats. Muskrats contaminated with PCBs also cause adverse effects to muskrat predators such as mink.

In summary, due to the human health and ecological risks associated with the 12th St.-OU4, the objectives of the RA must address the following risks:

- Human health risks for persons who trespass or work on the 12th St.-OU4.

- Human health and ecological risks due to past migration of PCB from the landfill to the woodland, wetlands, adjacent property, former powerhouse discharge channel, and the Kalamazoo River.

- Human health and ecological risks due to the continuing release of PCB from the landfill to the woodland, wetlands, adjacent property, former powerhouse discharge channel, and the Kalamazoo River.

- Human health and ecological risks due to the potential additional release of PCB to the woodland, wetlands, adjacent property, former powerhouse discharge channel, and the Kalamazoo River caused by failure of the sides of the landfill.